SHIPLEY
A ROHM AND HAAS COMPANY

Shipley Ronal
PWB Metallization

PM99N013, Rev. 0

CIRCUPOSIT™ MLB Promoter 213

(for use with electrolytic regeneration)

Circuposit MLB Promoter 213 is the second step in Shipley's unique, patented three-step Circuposit 200 MLB Process. Circuposit MLB Promoter 213 is a replenishable alkaline permanganate bath that effectively removes drill smear and debris while texturizing remaining resin surfaces to ensure consistently superior coverage, adhesion and solderability.

Advantages

- Removes resin in a controlled uniform manner without the use of plasma, chromic acid, or concentrated sulfuric acid
- Cost effective compared to conventional desmear/etchback techniques
- Produces a textured resin surface ideal for electroless copper processing
- Dramatically improves electroless to hole-wall adhesion
- Dramatically reduces blow holes by offering a resin surface that is conducive to "locking in" electroless copper deposits

Bath Make-up

WARNING! Refer to Handling Precautions prior to making up bath.

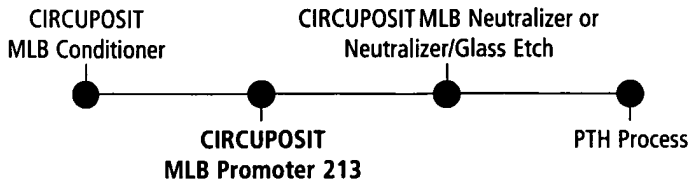
Add in the order listed and mix thoroughly between additions.

For example, to make a 100 gallon bath:

Deionized (DI) water	60 gallons
Circuposit MLB Promoter 213 B	15 gallons
Circuposit MLB Promoter 213 A	10 gallons

Adjust bath to full working volume with DI water.

Circuposit 200 MLB Process



Operating Conditions

Temperature:	150°–180°F (66°–82°C)*
Immersion Time:	5–15 minutes*
Agitation:	Solution agitation and through-hole agitation is strongly recommended.
Filtration:	A 5–10 micron SS screen filter is recommended.
Rinsing:	Thorough rinsing is essential to optimize process performance and to ensure prolonged bath life.
Ventilation:	Good ventilation is recommended.

*Consult with your Shipley Ronal Technical Representative for more detailed process information and applications for various substrates.

Automatic Controller

The Circuposit SE-200 Series Controllers and regeneration units have been developed by Shipley to automatically control the Circuposit MLB Promoter 213 bath; their use is recommended. Ask your Shipley Ronal Technical Representative for details. Refer to the controller manuals for operating details.

Manual Bath Control and Replenishment

Maintain the bath volume with DI water.

Total manganese concentration[1], normality, and parameters are controlled through additions of Circuposit MLB Promoter 213 A and B, respectively. The table below gives acceptable operating ranges as well as the optimum for each parameter.

Parameter	Range	Optimum
Total Manganese	8-12% 213 A	10% 213 A
Normality	1.1–1.3 N	1.2 N
Manganate	7-18 g/l	<15 g/l

[1]Total manganese is a measure of both permanganate and manganate concentrations and is expressed as % Circuposit MLB Promoter 213 A.

Circuposit MLB Promoter 213 A is added to the bath to maintain the total manganese concentration, expressed as percent 213 A. Make additions based on the supplied analytical procedure. For example: if analysis indicates that total manganese has fallen to 8% 213 A, make a 2% by volume addition of Circuposit MLB Promoter 213 A. Circuposit MLB Promoter 213 B is added to the bath to maintain normality.

Circuposit MLB Promoter 213 B Replenishment Schedule for 100-gallon Bath	
Normality	213 B Addition
1.30	none
1.25	none
1.20	none
1.15	0.63 gallons
1.10	1.25 gallons

The manganate concentration is controlled through the use of Shipley's electrolytic regeneration system.

Once the controller and electrolytic regeneration are installed and set, maintain the manganate concentration between 7–18 g/l by adjusting the amperage 10–15%. If the manganate concentration rises towards the upper specification limit (18–20 g/l), increase the amperage. If the manganate concentration falls to the lower specification limit (5–7 g/l), decrease the amperage. After any amperage adjustment, reanalyze the bath one hour later to ensure optimum manganate concentration.

DANGER! Circuposit MLB Promoter 213 A is a strong oxidizing agent. Be careful not to inadvertently add this component into the adjacent neutralizer solution as a violent reaction can occur.

Permanganate/Manganate Control Procedure

I. Principle

The permanganate and manganate levels are determined spectrophotometrically by measuring the absorbance at light wavelengths of 526 nm and 603 nm, respectively. A solution is diluted with 0.1N reagent grade sodium hydroxide (NaOH) and analyzed with a spectrophotometer. The calculation compensates for the mutual interference of the two species.

II. Reagents and Instruments

a) 0.1N sodium hydroxide (NaOH): use a commercially available reagent buffer solution to obtain the most reliable results.

b) Spectrophotometer (Hewlett Packard Model 8450 UV/VIS has been used, as has a Bausch and Lomb Spectronic 20).

III. Procedure

a) Pipette a 5.0 ml sample of the Circuposit MLB Promoter 213 bath into a 50 ml volumetric flask. Bring to volume with 0.1N sodium hydroxide.

b) Pipette 1.0 ml of the diluted sample into a 100 ml volumetric flask. Bring to volume with 0.1 N NaOH.

c) Measure and record the absorbance of the dilution from Step B at light wavelengths of 526 and 603 nm. Use 0.1N NaOH as a reference. **NOTE:** Since the diluted solution will continuously disproportionate, it is best to complete Steps a–c as quickly as possible.

IV. Calculation

$$\text{Permanganate (g/l)} = \frac{(58.07 \times Abs_{526}) - (18.96 \times Abs_{603})}{L}$$

$$\text{Manganate (g/l)} = \frac{(114.3 \times Abs_{603}) - (10.19 \times Abs_{526})}{L}$$

$$\text{Total Manganese (\% 213 A)} = \text{Permanganate Concentration (g/l)} + \frac{[0.86 \times \text{Manganate Concentration (g/l)}]}{5.8}$$

WHERE:

Abs_{603} = Absorbance at wavelength 603 nm

Abs_{526} = Absorbance at wavelength 526 nm

L = Path length in centimeters = 1

Normality Control Procedure

I. Principle

Normality is determined via pH titration with 0.10N hydrochloric acid.

II. Equipment

pH meter buffered to pH 7.0

III. Reagents

Hydrochloric acid (HCl), 0.10N standardized.

IV. Procedure

a) Pipette a 1.0 ml sample of Circuposit MLB Promoter 213 bath into a 250-ml beaker.

b) Add approximately 100 ml of distilled water.

c) Place the pH electrode into the mixture.

d) Titrate with 0.100 N to pH 7.0.

e) Record the number of ml of HCl titrated.

V. Calculation

$$\text{Normality of bath} = \frac{\text{ml of HCl} \times \text{N of HCl}}{\text{sample size (1.0 ml)}}$$

Electrolytic Regeneration

Principle

Electrolytic regeneration eliminates the need for chemical regenerations and increases the bath life. Electrolytic regeneration of manganate to permanganate occurs at a constant rate and is directly proportional to the current applied to the electrode cells. To maintain efficient regeneration, 2.5 amps of current must be applied per gallon (0.66A/liter) of Circuposit MLB Promoter 213 bath. Each Shipley Ronal in-tank electrode is capable of 125 amps and is available in several standard sizes. Contact your Shipley Ronal Technical Representative for assistance in selecting the appropriate in-tank regeneration system.

Yield

Bath yield is adversely affected by factors such as drag-in of organics, high bath temperature, and localized overheating.

Bath life may be determined by specific gravity. Typically the bath may be discarded at a specific gravity of 1.23 (measured at operating temperature).

Circuposit MLB Promoter 213

Product Data

Circuposit MLB Promoter 213 A is a strong oxidizing solution.

Specific gravity at 20°C:	1.37
Color:	Dark purple

Circuposit MLB Promoter 213 B is a caustic solution.

Specific gravity at 20°C:	1.3 (approx.)
Color:	Water-white
pH:	>12
Normality:	8 (approx.)

Equipment

Tanks: Titanium, 316 stainless steel, or reinforced, nonpigmented polypropylene.

Racks: 316 stainless steel.

Heaters: Teflon or Teflon-coated heaters are recommended. Do not use quartz, stainless steel, or titanium immersion heaters (see Handling Precautions).

Agitation: Teflon solution pumps, a stainless steel mixer, or mild air. NOTE: If using 316 stainless steel, ensure that welds are also 316 stainless steel.

Handling Precautions

Before using this product, consult the Material Safety Data Sheet for details on product hazards, recommended handling precautions, and product storage.

CAUTION! When using immersion heaters, failure to maintain proper volume level can expose tank and solution to excessive heat resulting in a possible combustion hazard, particularly when plastic tanks are used.

Storage

Store Circuposit MLB Promoter 213 A and B only in upright, original containers in a dry area at 50°–90°F (10°–32°C).

Waste Treatment

A used bath may be treated according to Shipley Ronal Waste Treatment Procedure 92-6. Contact your Shipley Technical Representative for more information. It is your responsibility to verify that this procedure complies with federal, state and local laws and regulation for wastewater discharge.

Due to the nature of Circuposit MLB Promoter 213 A and B, disposal of them, or residues therefrom, should be made in compliance with federal, state and local environmental laws.

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